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Patent Office
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I, LEANNE MYNOTT, MANAGER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2004901547 for a patent by MOBILE REFRIGERATED AIR PTY LTD as filed on 24 March 2004.



WITNESS my hand this
Fifth day of May 2005

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Patents Act 1990

PROVISIONAL SPECIFICATION**Invention Title: PALLETISED COLLAPSIBLE REFRIGERATION CONTAINER****The invention is described in the following statement:**

This invention relates to a palletised collapsible refrigeration container capable of maintaining a refrigerated space temperature for several days without the need for any auxiliary power source.

The base is a thermally insulated palletised housing with integral seal mechanism located around the upper face perimeter (channel) & designed for 4 way fork lift entry. A battery pack housing is integrated within the raised feet.

Hinged thermally insulated side panels with mitred (45°) corners including seal mechanism in a concertina configuration are designed to collapse & open to form a rectangular (square) shape. The horizontal top & bottom end surfaces interface & seal against the palletised base & lid mating surfaces (channels).

The lid is a thermally insulated housing with integral seal mechanism located around the lower face perimeter (channel). An integrated refrigeration housing located (moulded) as part of the external surface contains the heat rejection side of the refrigeration module. A cold storage refrigeration coil is mounted to the lid under face. All refrigeration cycle components are in fluid communication with each other.

The refrigeration container may also be powered off any suitable power source, such as mains power 240VAC 50Hz or 115VAC 60Hz.

The container & thermal insulation may be manufactured (moulded) from any suitable material, such as polymer or composites.

The seal mechanism may be manufactured (extruded) from any suitable material, such as rubber type compounds.

The hinge mechanism may be manufactured from any suitable material, such as metal, polymer, composite or elastic type compounds.

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The latch mechanism may be manufactured from any suitable material, such as metal, polymer, composite or elastic type compounds.

The tie strap mechanism may be manufactured from any suitable material, such as metal, polymer, composite or elastic type compounds.

Background:

This invention will contribute significant improvements in refrigeration shipping container movements. Conventional refrigeration transportation means such as the use of refrigerated truck, refrigerated rail car, refrigerated inter-model container (land) & in particular passive cooled airfreight container (dry/wet ice) may no longer be necessary.

Transportation means without refrigerated provisions or power source will be suitable for the movement of Palletised Collapsible Refrigeration Containers. Containers will be transported via land (rail/road) loaded onto aircraft & destined for anywhere in the world maintaining cold chain integrity.

There is a need for a stackable single pallet footprint collapsible stand-alone refrigeration container that maximises conventional rail/road transportation dimensions, such as two abreast (maximum width) stacked two high (maximum height).

Opportunity cost and direct expense of moving empty containers for both domestic and international markets runs into the tens of millions of dollars annually.

The advantages of shipping this type of refrigeration container are as follows:

- Collapsibility (several stacked containers replace shipping volume of a single empty container)
- Stand alone power source for several days (use of non-refrigerated vehicles)
- Super thermal insulation (Vacuum Insulation Panel) maximises refrigerated storage space
- Lightweight, hygienic & robust structure (use of composites & polymers)
- Container base substitutes pallet requirement (enclosure constructed around product)

The container assembly comprises the following main components:

- A palletised thermally insulated base including seal mechanism with integral battery compartment & 4 way forklift entry
- A thermally insulated hinge type collapsible concertina side panel configuration with latch mechanism
- A thermally insulated lid including seal mechanism with integral refrigeration unit

Invention Title: Palletised Collapsible Refrigeration Container

- A tie strap mechanism to secure lid & base to side panels and prevent against pillage

A typical application follows:

- The palletised container base is loaded with refrigerated product
- A collapsible concertina side panel configuration is opened to form a rectangular shape and located around the palletised container base interfacing seal mechanism perimeter
- A lid section with preconditioned cold storage refrigeration coil is positioned to interface over the side panels top face
- The assembly is secured with latch & strap mechanisms
- The assembly is fork lifted, loaded onto the tray of a truck & road transported
- The assembly is fork lifted, unloaded onto a tar mat & material handled into an aircraft hold

Principal of operation:

Prior to refrigeration product loading

- The Vapour Compression Refrigeration System is run off an external power source & the Cold Storage Refrigeration Coil is preconditioned by the removal of absorbed heat from a Eutectic Type Solution (or any other suitable solution) until maximum cooling capacity is achieved. (Example. Water Ice @ 0°C Latent Heat of Fusion: 335 kJ/kg)

Refrigeration Capacity

- The refrigerated product is maintained at refrigeration capacity of the Eutectic Solution until such time that the entire phenomenon Latent Heat of Fusion is absorbed
- A Cold Storage Refrigeration Coil sensor cuts in the Vapour Compression Refrigeration System to maintain refrigeration cooling capacity & further remove absorbed heat from the Eutectic Solution

In other embodiments of the invention the refrigeration cooling capacity can be maintained by either one of the above methods. By other types of refrigeration system or by the use of expendable refrigerants such as Dry Ice (CO₂) or Water Ice (H₂O)

Methods of Power Source:**Power Grid**

- Mains Power

Stand Alone

- Solar (Photovoltaic)
- Wind Generator
- Hydro Generator

Integrated

- Fuel Cell (Hydrogen)
- Battery Cell

Prior Art Systems:

There are no known collapsible palletised refrigeration containers of this type

To further assist with understanding the invention, please reference the accompanying information:

A) Illustrative Diagrams

Illustrative diagrams are shown in various configurations:

Diagram 1.

Illustrates an assembly of the Palletised Collapsible Refrigeration Container complete with hinge, latch mechanism, refrigeration module & strapping

Diagram 2.

Illustrates an assembly exploded view diagram, note the Hinged Thermally Insulated Side Panels in collapsed configuration with mitred corners, seal mechanism and Palletised Base integral seal mechanism located around the upper face perimeter (channel)

B) Drawings**Drawing 1.**

Shows a top view of the Palletised Collapsible Refrigeration Container with tentative dimensions of the refrigeration housing & base foot spacing

Drawing 2.

Shows an 'air-on' Condenser Coil view with tentative dimensions of heights, widths & material thicknesses

Drawing 3.

Shows a section A-A view of Drawing 2.highlighting tentative side panel thickness, internal dimensions including the Refrigeration Housing

Drawing 4.

Shows an 'air-off' Condenser Coil view

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DWG 1

DIA 1

DIA 2

DWG 2

DWG 3

DWG 4

DWG 5

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Mobile Refrigerated Air General Arrangement

Size	A3	Scale	1:20	Project	Palletised Collapsible Refrigeration Container
Date				Drawn	Checked
				RAP	ND
				Date	2 March 2004
				Sheet	1 Rev. A
				Draw No.	1234

